

## CLAIMS

### What Is Claimed Is:

Sub 917  
1. A differential casing comprising:

(a) a chamber, having an axle centerline and defined by  
5 at least one spherical surface and at least one opposing  
surface, wherein the centerpoint of said at least one  
spherical surface is substantially collinear with said axle  
centerline is offset from the centerpoint of said chamber by  
an offset distance along said axle centerline in a direction  
10 away from said opposing surface.

Sub 927  
2. A differential casing as in claim 1 wherein the ratio of  
the radius of said at least one spherical surface to said  
offset distance is at 30.

Sub 927  
3. An automotive differential mechanism comprising:

- (a) a first and second side gear; and  
20 (b) a differential chamber formed by offsetting the  
spherical centerpoint of said first side gear away  
from the surface of said second side gear.

4. An automotive differential mechanism comprising:

- (a) a pinion shaft;  
(b) a first pinion gear;  
25 (c) a second pinion gear;  
(d) a first side gear, having a first side gear outer  
radius;  
(e) a second side gear having a second side gear outer  
radius; and,

5 (f) a differential casing having a first axle shaft port, a  
second axle shaft port, a first inner radius, a first  
radius center point, a second inner radius and a second  
radius center point, wherein said second radius center  
point is offset a distance from said first radius  
center point such that when said first and second  
pinion gears, said pinion shaft and said first and  
second side gears are installed within said  
differential casing, said pinion gears and said pinion  
shaft force said first side gear outer radius into said  
first inner radius and said second side gear outer  
radius into said second inner radius such that said  
first side gear is substantially aligned with said  
first axle shaft port and said second side gear is  
substantially aligned with said second axle shaft port.

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15 Sub 637 5. An automotive differential mechanism according to claim 4  
wherein said first and second side gears do not have alignment  
shoulders.

20 Sub a37 6. A differential mechanism comprising:

- 25 (a) a casing adapted to be rotatably driven about an  
axis of rotation and having a chamber defined by  
walls;
- (b) a pair of pinion gears retained within said chamber  
rotatable about an axis of rotation normal to and  
having an intersection point with said axis of  
rotation of said casing;
- 30 (c) a pair of side gears having a part-spherical  
endwall;
- (d) means for retaining said side gears from rotating  
within said chamber about the axis of rotation of

5 said pinion gears including a pair of part-spherical regions defined in said chamber, each said region being defined by a wall of said chamber having a spherical shape substantially complementary to the end wall of one of said side gears and each said region providing a recess in said chamber for supporting one of said side gears;

- 10 (e) each of said side gear receiving part-spherical regions comprising part of a sphere having a center located on said axis of rotation of said casing and offset from said intersecting point in a direction providing a chamber extending more in the axial direction of said casing than in the direction of the axis of rotation of said pinion gears.

15 Sub B37 A method of assembling a differential mechanism having at least one spherical side gear, two pinion gears and a pinion shaft comprising the steps of:

- 20 (a) forming a casing with at least one spherical surface substantially complementary with a spherical surface of at least one spherical side gear;
- 25 (b) inserting at least one spherical side gear into said casing so that said spherical side gear is held in place by virtue of contact between said at least one spherical side gear and said complementary casing spherical surface and the support provided by said two pinion gears and said pinion shaft.